

**REMARKS**

The applicants have carefully studied the outstanding Office Action. In view of the prior art cited by the Examiner, the applicants have found it necessary to make significant amendments to the claim set. Because of the extent of these amendments, the applicants have preferred to cancel without prejudice all of the claims currently on file, and to submit a new claim set, claims 112 to 177. Claim 112 is a new independent claim, while claims 113 to 176 are claims dependent thereon, with dependencies which largely follow the recitations of the claims in the originally filed claim set. Claim 177 is equivalent to claim 24 of the originally filed claims, rewritten in independent form as proposed by the Examiner. Support in the specification for the elements of the new claim set is delineated below.

The applicants believe the new claim set to be fully responsive to all points of rejection raised by the Examiner to the originally filed claims, and to place the application in condition for allowance. Favorable reconsideration and allowance of the application are respectfully requested.

**Claim rejections - 35 USC § 112**

Claims 42 and 50 are rejected under 35 U.S.C. 112, second paragraph, for failing to particularly point out and distinctly claim the subject matter which the applicants regard as the invention, as they are duplicates of each other. The applicants submit that the Examiner's rejection is moot in the light of the cancellation without prejudice of these claims. The applicants have been watchful to avoid such duplication in the newly filed claim set.

**Claim rejections - 35 USC § 102**

Claims 1, 3, 5, 7, 11-13, 18, 42-44, 50, 59, 67, and 70-73 stand rejected under 35 USC § 102(e) as being anticipated by US 5,964,712 to Kubo et al. The Examiner states that "Kubo et al shows an isotopic gas analyzer that takes the ratio

of  $^{13}\text{CO}_2$  to  $^{12}\text{CO}_2$  in human breath with two wavelength stable light sources and a detector for detecting the absorption by each species."

The applicants respectfully submit that the Examiner's rejection is moot in the light of the cancellation of these claims. However, the applicants further submit that the isotopic gas analyzer disclosed in Kubo et al. differs from that recited in new claim 112 of the present application, in a number of aspects.

Firstly, the applicants wish to disagree with the Examiner's claim that the gas analyzer described in Kubo et al. has "wavelength stable light sources". Kubo et al. describes, in col. 17, lines 60-64, and in associated Fig. 7, the use of "an infra red source ... for example, a ceramic heater", which is a black body source of radiation. This, being broadband, cannot properly be described as a "wavelength stable light source". Furthermore, Kubo et al. shows only a single infra red light source, from which light is guided through two waveguides to sample cells. The specific wavelengths required for detecting the infra red rays transmitted through the gases being analyzed, are provided in the Kubo et al. gas analyzer by means of filters disposed in front of the detectors, as described in col. 18, lines 6-15, and associated Fig. 7.

In contrast to the light sources described in Kubo et al., new claim 112 of the present application recites "at least one wavelength-stable source of radiation of wavelengths characteristic of at least one of said at least first and second isotopic components", which is, to the best of the applicants' understanding, nowhere shown or suggested in Kubo et al.

Furthermore, the analyzer of Kubo et al. utilizes only one reference chamber, described in col. 18, line 38, as "the reference cell 11c", and as shown in associated Fig. 7. In contrast to the single reference chamber described in Kubo et al., new claim 112 of the present application recites "...at least a first reference chamber ..." and "... at least a second reference chamber ...", which, to the best of the applicants' understanding, is nowhere shown or suggested in Kubo et al.

Additionally, the reference cell of Kubo et al. contains a reference gas "having no absorption at a wavelength for measurement, e.g. nitrogen gas", as stated in col. 17, lines 21-23. In contrast to the reference gas described in Kubo et al., new

claim 112 of the present application recites that "each of said reference chambers contains a reference gas comprising said first and second isotopic components."

In view of the above-stated arguments, the applicants respectfully submit that three different elements are recited in new claim 112, which are not shown or suggested in the Kubo et al. gas analyzer. New claim 112 is not therefore anticipated by what is shown in Kubo et al., and is deemed to be allowable. New claims 113 to 176 are dependent on new claim 112, and recite further patentable matter, and are therefore also deemed to be allowable.

#### Claim rejections - 35 USC § 103(a)

Claims 2, 4, 6, 19-21, 25, 34, 36, 48, 60 and 61 stand rejected under 35 U.S.C. 103 (a) as being unpatentable over Kubo et al., in view of Rosenfeld et al. (U.S. Patent No. 4,755,675). The Examiner states that "Kubo does not use a gas discharge lamp. Rosenfeld et al is a gas analyzer that does. From this teaching, it would be obvious to modify Kubo et al to use a gas discharge lamp, as it is merely the substitution of one known light source for another."

The applicants respectfully submit that the Examiner's rejection is moot in the light of the cancellation without prejudice of these claims. However, the applicants further submit that, with regard to new claims 120-123 and their dependents, which do recite a gas discharge tube, the use of a gas discharge tube in the analyzer of Kubo et al should not be considered a simple substitution of one known light source for another, since such use would entail other structural changes to the analyzer of Kubo et al., such as the removal of the wavelength selection filters. Furthermore, although Kubo et al. does state in col. 17, lines 62-63, that the generation of the infrared rays may be achieved in any way, no indication or suggestion is given anywhere in Kubo et al., to the best of the applicants' understanding, of using any specific source other than the blackbody source actually described therein.

Claims 15-17 and 46 are rejected under 35 U.S.C. 103(a) as being

unpatentable over Kubo et al., in view of Cooper et al. (U.S. Patent No. 5,317,156). The Examiner states that "Kubo et al has a reference cell, but alternates measurements, rather than having two separate channels. Cooper et al shows two channels a measurement channel and a reference channel. From this teaching, it would have been obvious to modify Kubo to use 2 parallel channels, as it is merely the substitution of one known equivalent arrangement for another."

The applicants respectfully submit that the Examiner's rejection is moot in the light of the cancellation without prejudice of these claims. Additionally, the applicants wish to add that the recitation of the reference chamber of originally filed claims 15-17 and 46, has been incorporated into new independent claim 112 of the present application. With regard to new claim 112 and its dependents, the applicants submit that Cooper et al., like Kubo et al. shows only a single reference chamber, and Cooper et al., **unlike** Kubo et al., shows only a single sample chamber. The applicants therefore respectfully submit that no combination of Kubo et al. with Cooper et al. can render as obvious, new claim 112 of the present invention, or any of its dependents, with their recitation of:

"at least a first sample chamber ..... and at least a first reference chamber", and  
"at least a second sample chamber ..... and at least a second reference chamber".

Claim 58 stands rejected under 35 U.S.C. 103 (a) as being unpatentable over Kubo et al., in view of Micheels et al (US 5,957,858). The Examiner states that "Kubo does not use a beam homogenizer. Micheels does. Hence, it would have been obvious to modify Kubo to use such a beam homogenizer, as it is merely the substitution of one known equivalent measuring arrangement for another."

The applicants respectfully submit that the Examiner's rejection is moot in the light of the cancellation without prejudice of claim 58.

However, in order to relate the Examiner's rejection of claim 58 to new dependent claims 162 and 163, which do recite use of a homogenizer, the applicants have reviewed the Micheels et al patent, but were unable to find any direct reference to a separate beam homogenizer. The applicants have made the assumption that the Examiner is referring to the sample chamber of Micheels as the homogenizer. This

sample chamber, being a long and narrow waveguide chamber, in the form of a narrow tube with reflective side walls, of length typically 30 to 100 cm, and of diameter 0.3 to 2 mm, does indeed homogenize the beam passing through it, by its waveguiding effect. However, such an arrangement is quite different from the sample chambers described in the present application, and those of Kubo, which have free-space propagation therethrough, and in which, therefore, the addition of a homogenizer does improve the optical functionality of the chambers, and, to the best of the applicants' understanding, thus does add patentable matter to the claimed invention.

Consequently, with regard to new dependent claims 162 and 163, even if the teachings of Kubo were to be considered as anticipating these claims, other than the use of the beam homogenizer, which the applicants have submitted above that they do not, the applicants respectfully submit that use of such a beam homogenizer, is not merely the substitution of one known equivalent measuring arrangement for another.

Claim 22 is rejected under 35 U.S.C. 103 (a) as being unpatentable over Kubo et al., in view of Rosenfeld et al. as applied to claims 2, 4, 6, 19-21, 25, 34, 36, 48, 60 and 61, and further in view of Micheels. The Examiner states that "(t)he above combination has two separate detectors. Micheels et al teaches using a single detector for two wavelength measurements. Hence, it would have been obvious to modify the above combination to use a single detector, as it is merely the substitution of one known equivalent for another."

The applicants respectfully submit that the Examiner's rejection is moot in the light of the cancellation without prejudice of claim 22.

However, the applicants wish to relate the grounds of the Examiner's rejection of claim 22, to new dependent claim 113 and its dependents, which do recite use of a single detector for "detecting said transmission of said radiation through said chambers at wavelengths characteristic of said first and of said second isotopic component of said gas". The applicants respectfully submit that, to the best of their understanding, Micheels et al describes an isotopic gas analyzer using a

single sample chamber, and no reference chamber at all. The system of Micheels consequently teaches away from the systems of Kubo et al., and of Rosenfeld et al., both of which use reference chambers. The applicants therefore submit that combination of these three patents may not be valid, to render claims of the present application as obvious.

In addition to the above mentioned arguments regarding the inapplicability of combinations of the Kubo et al patent with the other cited patents, the applicants respectfully repeat their contention from above, that the teachings of Kubo et al do not anticipate any of the new claims of the present application, and that Kubo et al. cannot be used as a basis for rejections under 35 U.S.C. 103(a).

#### Claim support

Support for the six elements of new claim 112 may be found in the specification, *inter alia*, as follows:

(i) at least one wavelength-stable source of radiation of wavelengths characteristic of at least one of said at least first and second isotopic components:

Page 4, last para., Page 24, para. 3 and page 28, para. 2.

(ii) at least a first sample chamber comprising a sample of said gas to be analyzed, and at least a first reference chamber .....

Page 24, para. 3.

(iii) at least a second sample chamber comprising a sample of said gas to be analyzed, and at least a second reference chamber .....

Page 24, para. 3.

(iv) at least one detector detecting said transmission of said radiation through said chambers:

Page 23, para. 4, and page 27, para. 1.

(v) at wavelengths characteristic of said first and of said second isotopic components of said gas:

Page 5, para. 2.

(vi) wherein each of said reference chambers contains a reference gas comprising said first and second isotopic components:

Page 5, para. 3.

#### **Allowable subject matter**

Examiner's indication that original claim 24 would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims, is gratefully acknowledged by the applicants. The applicants have accordingly rewritten original claim 24 as new independent claim 177.

#### **Prior art made of record**

The Examiner has made of record prior art which is not relied upon, but which is considered pertinent to the applicant's disclosure, as follows:

Gross (U.S. Patent 5,479,019)

Murnick (U.S. Patent 5,394,236)

Weckstrom (U.S. Patent 5,908,789)

The applicants have carefully studied these patents, and to the best of their understanding thereof, none of them affect the patentability of any of the applicants' new claims, either alone or in combination with any of the other cited prior art.

#### **Conclusion**

The applicants therefore respectfully submit that, for the reasons mentioned

above, all of the new claims 112 - 177 are novel and unobvious over the prior art cited by the Examiner, and recite patentable material. Claims 112 - 177 are therefore deemed to be allowable. Reconsideration and prompt allowance of this application are therefore respectfully requested.

Respectfully submitted,